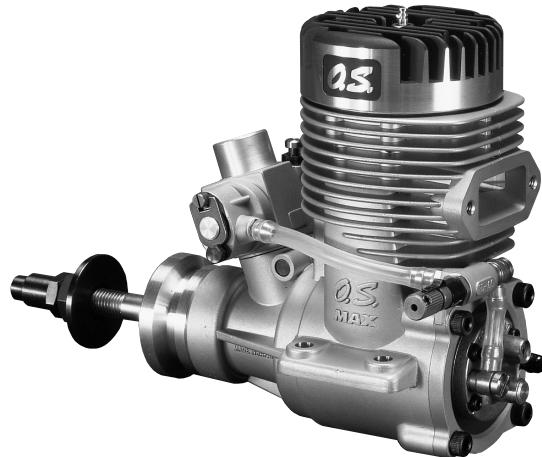


It is of vital importance, before attempting to operate your engine, to read the general 'SAFETY INSTRUCTIONS AND WARNINGS' section below and to strictly adhere to the advice contained therein. Also, please study the entire contents of this instruction sheet, so as to familiarize yourself with the controls and other features of the engine.

Keep these instructions in a safe place so that you may readily refer to them whenever necessary. It is suggested that any instructions supplied with the aircraft, radio-control equipment, etc., are accessible for checking at the same time.

CONTENTS

SPECIFICATIONS, SAFETY INSTRUCTIONS AND WARNINGS ABOUT YOUR O.S. ENGINE	1
INSTALLATION, FUEL TANK, PIPING, GLOW-PLUG, FUEL	2
PROPELLERS, TUNED SILENCER, RUNNING-IN	3
FUEL PUMP, MAINTENANCE, PARTS LIST	4



SPECIFICATIONS

Displacement	23.0cc (1.404 cu.in.)	Practical R.P.M.	1,800~10,000 r.p.m.
Bore	32.0mm (1.260 in.)	Power Output	3.5PS/9,000 r.p.m.
Stroke	28.6mm (1.126 in.)	Weight	830g (29.3oz.)

SAFETY INSTRUCTIONS AND WARNINGS ABOUT YOUR O.S. ENGINE

Remember that your engine is not a "toy", but a highly efficient internal-combustion machine whose power is capable of harming you, or others, if it is misused or abused.

As owner, you, alone, are responsible for the safe operation of your engine, so act with discretion and care at all times.

If at some future date, your O.S. engine is acquired by another person, we would respectfully request that these instructions are also passed on to its new owner.

■ The advice which follows applies to ALL MODEL ENGINES and is grouped under two headings according to the degree of damage or danger which might arise through misuse or neglect.

! WARNINGS

These cover events which might involve serious (in extreme circumstances, even fatal) injury.

! NOTES

These cover the many other possibilities, generally less obvious sources of danger, but which, under certain circumstances, may also cause damage or injury.

! WARNINGS

- Never touch, or allow any object to come into contact with, the rotating propeller and do not crouch over the engine when it is running.



- A weakened or loose propeller may disintegrate or be thrown off and, since propeller tip speeds with powerful engines may exceed 600 feet(180 metres) per second, it will be understood that such a failure could result in serious injury. (see 'NOTES' section relating to propeller safety).



- Model engine fuel is poisonous. Do not allow it to come into contact with the eyes or mouth. Always store it in a clearly marked container and out of the reach of children.



- Model engine fuel is also highly flammable. Keep it away from naked flame, excessive heat, sources of sparks, or anything else which might ignite it. Do not smoke or allow anyone else to smoke, near to it.



- Never operate your engine in an enclosed space. Model engines, like automobile engines, exhaust deadly carbon-monoxide. Run your engine only in an open area.

- Model engines generate considerable heat. Do not touch any part of your engine until it has cooled. Contact with the muffler(silencer), cylinder head or exhaust header pipe, in particular, may result in a serious burn.



! NOTES

- This engine was designed for model aircraft. Do not attempt to use it for any other purpose.

- Mount the engine in your model securely, following the manufacturers' recommendations, using appropriate screws and locknuts.

! NOTES

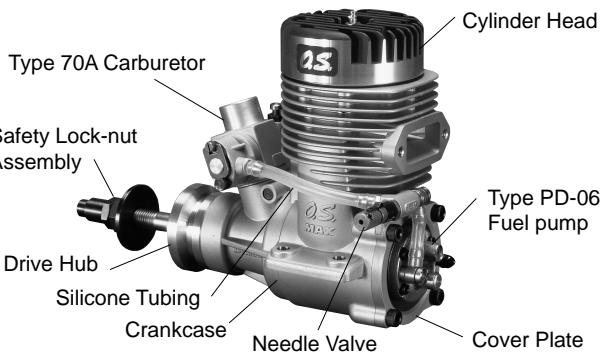
- Be sure to use the silencer (muffler) supplied for the engine. Frequent exposure to an open exhaust may eventually impair your hearing. Such noise is also likely to cause annoyance to others over a wide area.
- Fit a top-quality propeller of the diameter and pitch specified for the engine and aircraft. Locate the propeller on the shaft so that the curved face of the blades faces forward-i.e. in the direction of flight. Firmly tighten the propeller nut, using the correct size wrench.
- Always check the tightness of the propeller nut and retighten it, if necessary, before restarting the engine, particularly in the case of four-stroke-cycle engines. If a safety locknut assembly is provided with your engine, always use it. This will prevent the propeller from flying off in the event of a "backfire", even if it loosens.
- If you fit a spinner, make sure that it is a precision made product and that the slots for the propeller blades do not cut into the blade roots and weaken them.
- Discard any propeller which has become split, cracked, nicked or otherwise rendered unsafe. Never attempt to repair such a propeller: destroy it. Do not modify a propeller in any way, unless you are highly experienced in tuning propellers for specialized competition work such as pylon-racing.
- Preferably, use an electric starter. The wearing of safety glasses is also strongly recommended.
- Take care that the glow plug clip or battery leads do not come into contact with the propeller. Also check the linkage to the throttle arm. A disconnected linkage could also foul the propeller.
- After starting the engine, carry out any needle-valve readjustments from a safe position behind the rotating propeller. Stop the engine before attempting to make other adjustments to the carburettor.
- Adjust the throttle linkage so that the engine stops when the throttle stick and trim lever on the transmitter are fully retarded. Alternatively, the engine may be stopped by cutting off the fuel supply. Never try to stop the engine physically.
- Take care that loose clothing (ties, shirt sleeves, scarves, etc.) do not come into contact with the propeller. Do not carry loose objects (such as pencils, screwdrivers, etc.) in a shirt pocket from where they could fall through the propeller arc.
- Do not start your engine in an area containing loose gravel or sand. The propeller may throw such material in your face and eyes and cause injury.
- For their safety, keep all onlookers (especially small children) well back (at least 20 feet or 6 metres) when preparing your model for flight. If you have to carry the model to the take-off point with the engine running, be especially cautious. Keep the propeller pointed away from you and walk well clear of spectators.
- Warning! Immediately after a glowplug-ignition engine has been run and is still warm, conditions sometimes exist whereby it is just possible for the engine to abruptly restart if the propeller is casually flipped over compression WITHOUT the glowplug battery being reconnected. Remember this if you wish to avoid the risk of a painfully rapped knuckle!

The entirely new 23cc MAX-140RX has been designed expressly for FAI aerobatic competition under the latest F3A regulations which permit two-stroke engines to have a much larger displacement than the 10cc limit imposed hitherto. The 140RX continues the long established O.S. MAX contest engine tradition of unsurpassed quality of construction, durability, reliability, compactness, high specific output and high power-to-weight ratio. The 140RX takes into account the need to achieve greater durability through improved resistance to the crankshaft and main ball-bearing corrosion that may occur under the severe operating conditions of highly competitive FAI turnaround aerobatic flying.

The 140RX is equipped with a new O.S. Type 70A carburetor and O.S. Type PD-06 diaphragm fuel pump, specially developed for this engine. This fuel system provides stable power and consistent throttle response at all times, irrespective of fuel tank location or aircraft attitude.

The 140RX is an engine for experts and, in order to achieve the levels of performance of which it is capable, it is vitally important to correctly match the propeller and tuned exhaust system to the engine's operating characteristics. If propeller size and/or silencer length are incorrect, the engine may actually produce lower performance than that of a conventional standard engine. Therefore, please read through all the following instructions carefully.

NAMES OF ENGINE PARTS



INSTALLATION

With any single-cylinder engine, it is preferable to bolt the engine firmly to a body that has as much mass as possible, in order to minimize loss of power due to engine movement through vibration. However, the vibration that is transmitted through the fuselage of an aircraft may, dependent on the airframe construction, generate considerable resonant sound.

For F3A competition purposes, in order to reduce this vibration induced extra noise, it is now common to use a so-called "soft mount", e.g. to isolate the engine mounting from the actual fuselage structure with a resilient material(e.g. rubber) in the form of grommets, bushes or buffers.

• Power loss

When a soft mount is used, full-throttle power output may be reduced by the equivalent of 300 to 500 r.p.m. under load, depending on the flexibility of the mounting. Therefore, it is desirable to select a degree of rigidity that will provide a reasonable compromise. The softer the mount used, the better the noise reduction achieved - **but at the expense of greater power loss.**

• Throttle linkage

When the engine is throttled down to idling speed, vibration amplitude, with a soft mount, is considerably increased and this can result in fluctuation in the throttle opening and erratic operation if the idle position of the throttle rotor depends solely on the linkage to the servo. Therefore, it may be advisable to use the throttle stop screw on the carburetor, to positively fix the idling position. Remember to allow for some light spring compression in the throttle linkage travel, so as to avoid stalling the servo at the end of the throttle movement.

Note:Fixing the idling setting with the throttle stop screw, will also mean that the engine cannot be stopped by retarding the throttle control trim lever on the transmitter.

• Installation of tuned silencer and exhaust header pipe

When a tuned silencer is firmly secured to the fuselage, engine vibration will impose considerable strain on the exhaust header pipe and, in extreme cases, the header pipe may be damaged. It is advisable, therefore, to insert some resilient material in the mountings for the exhaust system, also.

• Installation of cowling, etc.

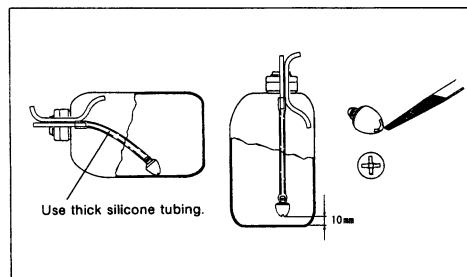
When a soft mount is used, the engine may vibrate more than expected. Make sure that the engine and spinner do not touch the fuselage or cowling, otherwise, overheating, additional noises and unreliable idling etc., may be caused.

• Securing the engine

Be sure to secure the engine to the mount firmly, using 4.5 - 5.0mm steel screws, such as Allen type, with locknuts.

FUEL TANK

If the fitting of the "kiunk" type fuel pick-up weight in the fuel tank is incorrect, the weight may stick to the tank wall, resulting in an irregular fuel flow to the carburettor, or, alternatively, in the fuel flow being cut off during the course of sharp aerobatic manoeuvres. Therefore, it is advisable to make slots in the end of the weight, with a file or hacksaw blade. Thoroughly wash out the weight to remove any minute particles of metal before reinstalling it in the tank.

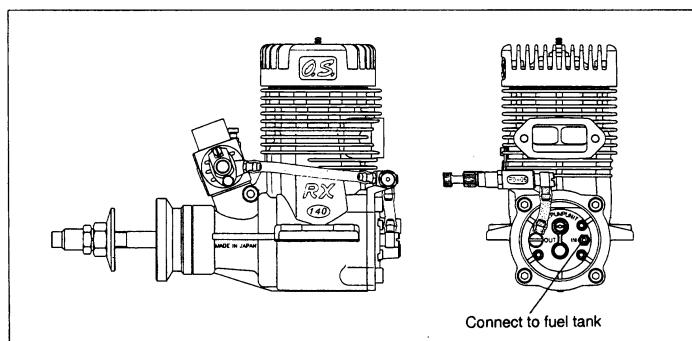


Alternatively, a 'BUBBLELESS' FUEL PICK-UP(Code No.71531000) may be used. This is an improved type of fuel pick-up weight which prevents air bubbles, generated by engine vibration, from reaching the carburettor and causing the engine to malfunction or stop. It is available from O.S. stockists as an optional extra part.

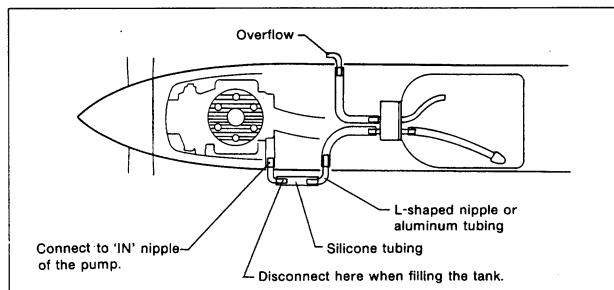
A silicone-rubber O-ring surrounds the 'Bubbleless' pick-up weight to prevent internal damage to the fuel tank.

PIPING

For piping, use heavy duty silicone tubing of approximately 2.5mm bore and 5mm outer diameter. It is advisable to secure connections with commercially available tube clips. Tube lengths should be kept as short as possible. Take care not to cause any kinks in the "plumbing".



Below is an example of a typical installation. A muffler pressurized fuel feed is not required. It may be convenient to lead the pipes outside the fuselage and connect with approx. 35mm (1-1/2") length of silicone tubing, as shown. When filling the tank from any position other than that shown in the sketch, be sure to pinch the silicone tube with a clip on the pump side to prevent fuel entering the pump.



GLOW PLUG

Since the suitability of the glow plug can have a considerable effect on performance and reliability of the engine, it is suggested that the user selects the R/C type plug found most suitable after practical experiments. The engine is fitted with an O.S. A5 glow-plug as standard.

FUEL

Use a good quality commercial fuel containing 5 to 15% nitromethane and at least 15% lubricant by volume. Lubricants can be either castor oil or synthetics provided that they are always of the best quality. Start with a fuel containing 10% nitromethane, and increase or decrease the nitro content if necessary.

PROPELLER

Use well balanced propellers only. Unbalanced propellers cause increased vibration and loss of power. Determine the best size and type after the engine has been run in. Suggested propellers are high quality wood or glass 15×14-16 or 16×13-15. Final selection should be made, of course, after test flights.

For safety, keep your face and other parts of the body well clear of the propeller when starting the engine or when adjusting the needle-valve while the engine is running. Remember that, with the bigger propellers that this engine is capable of turning, the blades cover a much larger area. Refer again to the Warnings and Notes on the first page of these instructions.

WARNING! There is a risk, particularly with large capacity engines, of the propeller flying off if the propeller nut loosens due to detonation or "knocking", should the engine be operated too lean or under too heavy a load. Obviously, this can be very hazardous. To deal with such risks, we have developed the special propeller locknut assembly supplied with the MAX-140RX. This prevents the propeller from flying off, even if the propeller itself should slip or loosen.

Fit the 140RX safety locknut assembly as follows:

- 1) Fit the propeller to the engine shaft, followed by the retaining washer and prop nut. Tighten the nut with the 14mm wrench.
- 2) Finally, fit the locknut and tighten firmly with the 12mm wrench, making sure that it locks into the propeller retaining nut.

IMPORTANT : With any engine, regardless of the type of propeller attachment used, make a habit of checking prop tightness before starting the engine. Remember that, especially with wooden props, there is a tendency for the material to shrink, or for it to be reduced by the serrated face of the drive hub.

TUNED SILENCER

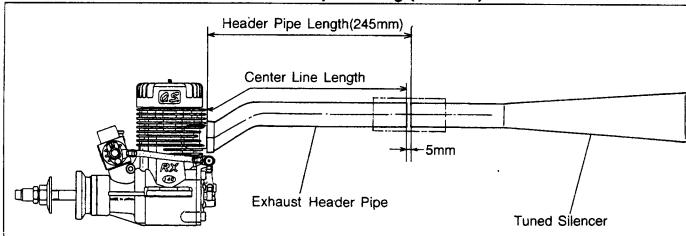
The O.S. Type T-6010 tuned silencer has been specially prepared for the MAX-140RX engine. It allows the engine to develop high performance at lower engine r.p.m. (e.g. around 8,000r.p.m.) which enables the contest flyer to qualify for noise reduction bonus points.

Here is an example of a combination with which maximum performance is obtainable at around 7,300~7,600r.p.m. You may, of course, use other combinations, but it is recommended to refer to this combination as a starting point.

Propeller	APC 16×14
Fuel	Commercial good quality fuel (10% nitromethane)
Exhaust Header Pipe	Actual length 240mm (see sketch below)
Tuned Silencer	O.S. Type T-6010
Effective Pipe Setting	245mm (see sketch below)

Note : Effective Header Pipe Setting means the distance from the engine's exhaust flange to the entry to the tuned silencer.

Effective Header Pipe Setting (245mm)



• Adjusting effective header pipe length

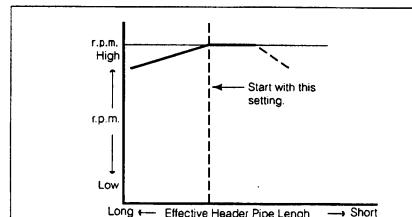
For other combinations or conditions, set the effective pipe length as follows.

(Important : Make sure that the engine is adequately run-in before operating it at full throttle for lengthy periods.)

Use the silicone tube sleeve supplied with the O.S. T-6010 and connect the silencer and exhaust header pipe together so that the effective pipe length is as long as possible.

Start the engine, open the throttle and measure the maximum r.p.m. at which the engine runs steadily for a lengthy period. Then shorten the header pipe setting by 10mm and measure r.p.m. again. Repeat this procedure, checking r.p.m. each time, until no further increase in speed is recorded.

Note : Be sure to use the same fuel and propeller while making these checks.



From this measured data, you will find a range of settings through which r.p.m. do not vary significantly. Set the header pipe length at the beginning of this range (See diagram bottom left) and fly the model.

If the pipe length is too short, the needle-valve adjustment range at maximum r.p.m will be narrow, and r.p.m. will tend to vary too much in the air, especially when revolutions build up as load decreases. Also, power will tend to drop off excessively against increased load in the air. To correct this, increase the header pipe's effective length.

Note : Engine r.p.m. recorded on the ground are different from those achieved in flight; not only because of increased propeller loading when the aircraft is stationary, but also because the cooling airflow over the engine and tuned silencer is reduced. Therefore, optimum header pipe adjustment should be finally set only after actual flight tests.

The power absorption of individual propellers of the same size (dia. and pitch), even from the same manufacturer, may differ quite markedly. This can cause r.p.m. to vary between 300 and 500 with standard propellers and between 100 and 200 with high quality propellers. Therefore, it may be necessary to readjust the header pipe length when a new propeller is fitted. Be sure to check the r.p.m. in addition to the balance and pitch of the propeller, before using it for flight.

If the pipe length is not set properly, the engine will not only fail to develop its full performance but could also be damaged through overheating.

If you wish to further reduce sound level, to meet extra severe noise regulations, a larger (or coarser pitch) propeller may be fitted to lower operating r.p.m. It will, of course, be necessary to increase the header pipe length accordingly.

Because noise generated by the engine and propeller becomes louder as the r.p.m. increase, it is environmentally desirable to run engines at reduced r.p.m. for quieter operation, whenever possible.

RUNNING-IN ("Breaking-in")

For long life and high-performance, this engine needs to be properly "run in", or "broken-in". The following settings apply when using a fuel containing not less than 15% lubricant and not more than 10% nitromethane.

• Needle-valve setting for starting

Open the needle-valve two turns from the fully closed position. When using the optional fine-tapered needle supplied with the engine, open the needle-valve approx. three turns.

• Bench or ground running

Preferably, use a propeller of slightly lower pitch than the one intended for actual flight. Start the engine and open the throttle. Close the needle-valve gradually and allow the engine to run at its maximum r.p.m. for just one or two seconds, then immediately reopen the needle-valve a half-turn and run the engine with this rich mixture for 5 to 6 seconds.

Repeat this procedure until the fuel tank is empty.

• Idling adjustment

Start the engine with the needle-valve setting at the original starting position. Close the needle-valve gradually and set it at 1/8 to 1/4 turn opened from the maximum r.p.m. position. Adjust the idling with this needle-valve setting.

• In-flight running-in

During the first 3 or 4 flights, try to avoid successive nose-up manoeuvres. Since, during running-in, the engine will tend to overheat, set the needle-valve carefully so that the mixture is always slightly rich. If the mixture becomes lean during a nose-up manoeuvre such as a loop, land the model and open the needle-valve 1/8 to 1/4 turn. If the engine becomes too rich during level flight with this needle-valve setting, increase the header pipe setting 10 to 20mm and re-set the needle-valve. At least 10 flights are required for the completion of running-in. Note that the engine will develop its full performance only after running-in is completed.

• Needle-valve sensitivity

If the needle-valve adjustment is found to be too critical when using the standard needle fitted to the engine, this may be replaced with the optional, less sharply tapered needle (Code No.22681980), to de-sensitize adjustment.

Note : It is important to be able to run the engine on a rich mixture during the breaking-in period to avoid overheating. If the fuel/air mixture does not become sufficiently rich, even when the needle-valve is opened more than 5 turns, first check that the carburettor has not become clogged with dirt or fluff. Also check that the fuel tubing has not become holed or split and that the fuel pick-up weight is not sticking to the tank wall. (See previous reference to 'FUEL TANK'.) If, at any time, the engine cannot be persuaded to run rich after checking the above, it is possible that a fault has developed in the pump. In this case, consult the O.S. engine distributor in your country.

As the running-in proceeds, a slightly different idling mixture will be required for best carburettor performance. Therefore, adjust the mixture control valve accordingly. During the first few (running-in) flights, the engine may sometimes stop because the carburettor adjustments have yet to be finalized at this stage. Be prepared, therefore, to make an emergency landing at this time.

PD-06 FUEL PUMP- WARNING!

Never disassemble the pump

If the pump is dismantled, its original performance may not be restored.

Never move the screw on the pump

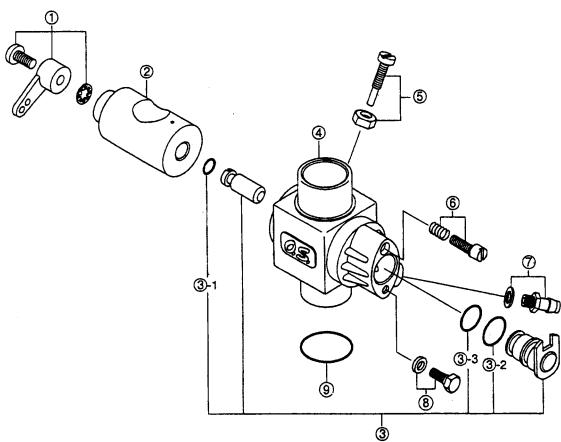
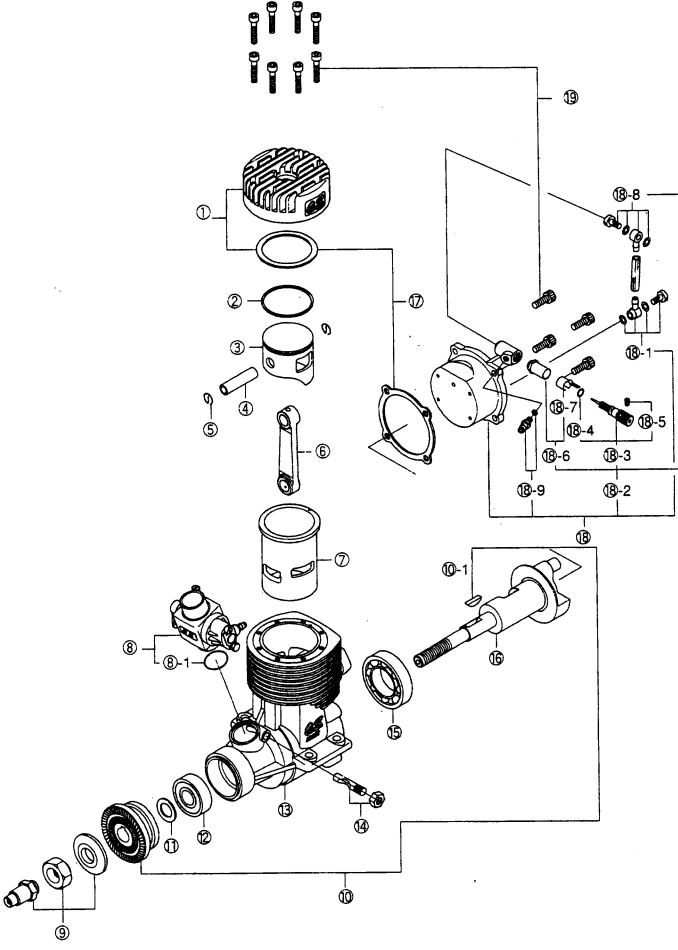
This is precisely adjusted at the factory. If the screw is disturbed, it cannot be re-set at its optimum position without using special measuring instruments.

Never attempt to "clean-out" the inlet and outlet nipples with a sharp instrument, such as a pin or thin wire.

This will damage the pump and render it inoperative.

Use fuel filters

Any foreign matter entering the Pump System may interfere with its correct functioning and may even damage the pump diaphragm. Be sure to filter all fuel before filling the tank and, most important, use a good quality fine filter in the delivery tube between the tank and pump.



MAINTENANCE

As noted above, foreign matter in the fuel used may cause malfunctioning of the pump and/or carburetor. Be sure to use a high quality fuel filter between the refuelling can and fuel tank. The O.S. Super Filter (L) is available as an optional extra part. The Super Filter (L) is fitted inside the fuel can at the outlet and has a special double filter element to ensure that the fuel tank is always supplied with clean fuel.

Be sure to check the carburetor at least once every 30 flights. Remove the needle-valve holder from the carburetor, using the appropriate open-ended wrench, and extract any foreign matter that may have lodged in the threaded part of the carburetor body. Minute particles of foreign matter may upset mixture strength, so that engine performance becomes erratic and unreliable. Remember that obstruction to fuel flow may also cause the engine to become overheated, resulting in internal damage.

If, after use, the fuel system is left unattended for a lengthy period, there will be a tendency for the methanol content of the fuel to evaporate sufficiently for the oil content to "gum" the internal parts of the pump. Therefore, it is advisable, at the end of the day's flying, to empty the fuel-tank, invert the engine and pump out the remaining fuel in the system by rotating the propeller until no more fuel is ejected from the carburetor.

If the pump is not in use for a while (more than one month), remove the pump and wash out its interior by injecting methanol through the "IN" nipple. Fit the sealing cap (provided) to the nipples, after draining out the methanol.

Note : Kerosene will cause swelling and rapid deterioration of the fuel tubing. Do not, therefore, use kerosene for cleaning this engine.

ENGINE PARTS LIST

No.	Code No.	Description
①	2 9404 000	Cylinder Head
②	2 9403 400	Piston Ring
③	2 9403 200	Piston
④	2 9406 000	Piston Pin
⑤	2 8117 000	Piston Pin Retainer
⑥	2 9405 000	Connecting Rod
⑦	2 9403 100	Cylinder Liner
⑧	2 9481 000	Carburetor Complete(70A)
⑧-1	2 9015 019	Carburetor Rubber Gasket
⑨	4 5910 200	Lock Nut Set
⑩	2 9408 000	Drive Hub
⑩-1	4 5508 200	Woodruff Key
⑪	4 5520 000	Thrust Washer
⑫	2 9431 000	Crankshaft Ball Bearing(Front)
⑬	2 9401 000	Crankcase
⑭	2 9081 719	Carburetor Retainer
⑮	4 6030 008	Crankshaft Ball Bearing(Rear)
⑯	2 9402 000	Crankshaft
⑰	2 9414 000	Gasket Set
⑱	7 2507 000	Pump Unit PD-06
⑲-1	4 5571 100	Universal Nipple(L3.5)
⑲-2	2 9481 900	Needle Valve Assembly
⑲-3	2 9481 970	Needle
⑲-4	2 4981 837	"O" Ring(2pcs.)
⑲-5	2 6381 501	Set Screw
⑲-6	2 7381 940	Needle Valve Holder Assembly
⑲-7	2 6711 305	Ratchet Spring
⑲-8	4 5571 000	Universal Nipple(S3.5)
⑲-9	2 2681 953	Fuel Outlet
⑲	2 9213 000	Screw Set
	7 1605 100	Glow Plug A5
	2 2681 980	Needle
*	7 2102 100	Exhaust Header Pipe Assembly
*	7 2104 200	Tuned Silencer T-6010
*	2 7984 000	Mixture Control Carburetor(70B)
*	4 5910 300	5/16"-M5 Lock Nut Set
*	7 1531 000	Bubbles Weight

CARBURETTOR PARTS LIST

No.	Code No.	Description
①	2 1881 400	Throttle Lever Assembly
②	2 9481 200	Carburetor Rotor
③	2 9481 600	Mixture Control Valve Assembly
③-1	2 7881 820	"O" Ring (2pcs.)
③-2	2 7881 810	"O" Ring (L) (2pcs.)
③-3	2 7881 800	"O" Ring (S) (2pcs.)
④	2 9481 100	Carburetor Body
⑤	2 9481 300	Rotor Stopper
⑥	2 7881 330	Mixture Control Screw
⑦	2 2681 953	Fuel Inlet
⑧	2 7681 340	Mixture Control Valve Stop Screw
⑨	2 9015 019	Carburetor Gasket

The specifications are subject to alteration for improvement without notice.
* Optional extra parts

O.S.ENGINES MFG.CO.,LTD.

6-15 3-Chome Imagawa Higashisumiyoshi-ku

Osaka 546-0003, Japan TEL. (06)702-0225

FAX. (06)704-2722